

1973). Further, different sound frequencies produce corresponding brain wave changes and related behavioral tendencies (Green, 1973).

The basic broadcaster's course (BBC) of the Defense Information School (DINFOS), Fort Harrison, Indiana, was selected as the test unit. The broadcaster's training involves conditions of time pressure and high-skill requirements and could be favorably affected by technology which reduces stress (Waldkoetter & Milligan, 1978). A trial demonstration of hemispheric synchronization (Hemi-Sync) techniques was experienced by a select number (N=10) of the test proponent (Soldier Support Center, National Capital Region) personnel and test unit (DINFOS) staff and faculty to assure the absence of risk and promotion of relaxation (Sternberg, 1982). The SSC-NCR and DINFOS concurred that the test was feasible. Five test objectives were defined to evaluate the acceptability, adaptability, and effectiveness of the technology.

## **APPROACH**

The training technology was made available to the test class, BBC 1-83 (4 October to 16 December, 1982), of 22 initial students for 10 consecutive weeks covering the Voice and Diction, Radio, and Television training segments. All armed forces were represented in the test class and two control groups for course performance and stress responses. The sound tapes presented voice instruction and stereo signals to activate various responses of relaxation, attention, concentration, and readiness. Specifically, the tapes were designated as Hemi-Sync Demo, Fast-Ten, Sound-Sleep, Attention, Fast-Nap, Concentration, Peak Performance, and On-the-Air. Hemi-Sync Demo familiarized the students with the use of the sound process in training (10 min). Fast-Ten gave a set of 10 signals for encoding various responses to affect desired performance in training and other activities (31 min). Sound-Sleep was patterned to give completely restful sleep as induced by the chosen sound frequencies (46 min). Attention was structured to relax and prepare for some activity with greater readiness (11 min). Fast-Nap provided a compressed period of sleep to regain energy (31 min). Concentration was designed to relax the user and focus attention on a given topic while remaining awake (46 min). Peak-Performance was prepared to enhance key aspects of classroom performance from a relaxed state (11 min). On-the-Air was given after the third week to prepare for critical radio training tasks using guided relaxation with specific performance instructions (31 min). For all tapes there were mixes of selected sound frequencies and "voice-over" instructions.

A schedule for tape use was set up by class day, week, and course segment. Two or three tapes were assigned during the class day and three after class during the first six weeks with six tapes used during weekends. During the remainder of the BBC, two tapes were identified for the class day with one for after class. Tape use varied according to the course segment and student reactions. Once tape responses were achieved students were permitted to individually revise the tape schedule as long as minimal exposure was reported. Tape usage was programmed to a reduced level as the course progressed. Both SSC-NCR and DINFOS personnel were available with MIAS assistance throughout the test to respond to test class questions and experiences.

Test students were members of BBC 1-83 and not selected to fulfill given sample criteria due to DINFOS training constraints. However, all students met the basic selection requirements for DINFOS training. The BBC 1-83 proved atypical in that a larger percentage of students were

identified to have academic deficiencies relating to recycle status, remedial English, and vocabulary. The test class had 66.7% with a deficiency status in comparison to 53.7% for the course performance control group. The larger deficiencies percentage of the test class was expected to adversely affect overall test class performance.

## **FINDINGS**

Materials and procedures were developed to address the test objectives. The scope of the Concept Evaluation Plan (CEP) was to explore the applicability of the Hemi-Sync technology in training students in the BBC at DINFOS. The effects of the training technology were to be measured in relation to performance and relaxation. Students were observed periodically during training. A weekly questionnaire was given for weeks one, two, three, seven, and ten, with four end-of-course questionnaires administered addressing student stress and course experiences, use of the tapes, peer/classmate opinions, and instructor observations. The test class initially of N=22 was compared to three immediately graduated classes combined (N=48) for a course performance control group for each course segment: Voice and Diction, Radio, and Television, with the progressive attrition accounted for. The test class (N=9) after attrition was compared to the immediately graduated class (N=10) for stress control at the end of the BBC 1-83.

The five test objectives were measured by collection of questionnaire data designed to probe objective and subjective experiences related to the tape application and responses. Course performance records were also analyzed to compare any actual differences between classes which were possibly related to the training technology. The graduating test class students (N=9) and prior (stress control) class (N=10) both agreed the BBC was “somewhat to extremely stressful” This finding was significant beyond the 1 percent level (using the chi square ( $X^2$ ) statistical test), for each group, indicating it would occur only one time out of 100 by chance for each group. This finding reflected highly reliable agreement between these classes and verified the need to apply this technology to the course sequence.

The five test objectives and corresponding results with key data indicators are reported below. The number (N) of responses varied due to approved student absences, data omissions, and progressive attrition. Both statistically significant results and selected consensual opinions are reported to give a critical review of responses to the tested technology.

### **1. Evaluate the acceptability of Hemi-Sync by students.**

a. The mean rating on 16 out of 16 behavioral characteristics of the graduating test students (N=8) showed moderate or high improvement with tape use. It was expected by chance that eight behavioral characteristics would show a rating of “some or no improvement,” if test students found Hemi-Sync unacceptable.

## **BEHAVIORAL CHARACTERISTICS**

More energy available  
More restful sleep  
Feel more healthy  
Improved self control

Fewer “down” periods  
Less need for coffee, alcohol, etc.  
Improved study habits  
Improved reaction to physical

Less irritability/frustration  
Improved concentration  
More relaxed  
Less tension  
Increased alertness

activity  
Improved fluency  
Improved retention of information  
Improved ability to think more  
clearly

This finding was significant beyond the 1 percent level using the chi square ( $X^2$ ) statistical test.

- b. 88.9% of the graduating test students (N=9) rated the “On-the-Air” radio performance tape as “helpful” to “very helpful.” This finding was significant beyond the 5 percent level using chi square ( $X^2$ ).
- c. 88.8% of the graduating test students (N=9) described the tapes as having been some degree of help during their completion of course requirements. This finding was significant beyond the 5 percent level using chi square ( $X^2$ ).
- d. 82.4% of the initial test students (N=17) indicated the tapes had also helped them to improve their performance during the first week of training. This finding was significant beyond the 1 percent level using chi square ( $X^2$ ).
- e. 72.7% of the graduating test students (N=11) responded with positive comments during a post-test interview supporting the use of Hemi-Sync technology. The comments endorsed critically acceptable features of the Hemi-Sync experience describing a favorable majority opinion.

2. Evaluate the acceptability of Hemi-Sync use by students by faculty.

- a. The DINFOS faculty observed that the technology was as successful as their usual procedures and could help toward needed stress reduction.
- b. Faculty saw no impairing results and regarded the technology as an acceptable instructional approach.

3. Evaluate the need to adapt basic Hemi-Sync technology for use in the course (570-71R10).

- a. None of the tapes was considered as “not helpful” by the test class. The range of student ratings for all tapes was from “barely helpful” to “very helpful.” This could imply some tapes may profit from additional “sound” quality control or content revision.
- b. Test students indicated more time for tape use during the course should be available for Hemi-Sync training with some minor editing of “voice-over” instruction. 77.8% of the graduating test students (N=9) indicated they had used less than the suggested time for tapes outside of class.

4. Evaluate the need to adapt performance measures in course 570-71R10 to provide objective and subjective tests of effectiveness of the Hemi-Sync technology.

- a. The existing DINFOS performance measures did not have questions or rating procedures which could produce data specifically related to the Hemi-Sync technology.

b. Five questionnaires were developed to collect HEMI-SYNC oriented data and a screening procedure was designed to analyze course records and tests for objective data.

5. Evaluate the effectiveness of the HEMI-SYNC technology, in training students in course 570-71R10.

a. The test class graduated 50% of its students (N=11) with the performance control group graduating 45.8% of its students (N=22). Graduates for the test and control classes were reduced to half or less of initial groups by academic and administrative attrition. Attrition could not be significantly reduced in the test because the performance requirements emphasized in part aptitudes (e.g., voice qualities, poise, etc.) rather than immediately trained skills. The difference between percentages graduating did not approach significance.

b. 100% of the test students without any academic deficiency (N=7) passed the Voice and Diction course segment, with 78.9% of the course performance control group without any deficiency (N=19) passing. This difference between classes was not significant but may imply that among students without deficiencies, the Hemi-Sync training may enhance course performance.

c. 92.3% of the remaining test students (N=13) passed the Radio course segment, where 78.6% of the course performance control group (N=28) passed. The passing rate difference between classes was not significant.

d. Test students displayed a distinctive number of positive training differences. These differences were favorable over the stress control group, toward their Hemi-Sync experiences and over the course performance control group in terms of enhanced stress reactions and performance responses. Such differences were observed with 100% of the test students rating "performing practical exercises" as relaxing compared to 0% for the stress control; test students rating improved behavioral characteristics; and test students exceeding the performance control on several of the above comparisons.

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